Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

$$z^2 + (x + a \cos \alpha)^2 = a^2,$$

or

$$x = \sqrt{a^2 - z^2} - a \cos \alpha.$$

The element of length of the arc is $ds = adz/\sqrt{a^2 - z^2}$, and the required surface

$$S = \int 2\pi x ds = 2\pi \int_0^{a \sin \alpha} (\sqrt{a^2 - z^2} - a \cos \alpha) \frac{adz}{\sqrt{a^2 - z^2}}$$

$$= 2\pi a \left[z - a \cos \alpha \int \frac{dz}{\sqrt{a^2 - z^2}} \right]_0^{a \sin \alpha}$$

$$= 2\pi a^2 \left[\sin \alpha - \cos \alpha \left(\sin^{-1} \frac{z}{a} \right)_0^{a \sin \alpha} \right] = 2\pi a^2 (\sin \alpha - \alpha \cos \alpha).$$

If $\alpha = \pi/2$, $S = 2\pi a^2$, as it should be.

The object of the choice of coördinate axes as assigned in the statement of the problem is not evident.

The volume is

$$V = \pi \int x^2 dz = \pi \int_0^{a \sin \alpha} (\sqrt{a^2 - z^2} - a \cos \alpha)^2 dz$$

$$= \pi \left[a^2(1 + \cos^2 \alpha) z - \tfrac{1}{3} z^3 - 2a \cos \alpha \left(\frac{z}{2} \sqrt{a^2 - z^2} + \frac{a^2}{2} \sin^{-1} \frac{z}{a} \right) \right]_0^{a \sin \alpha}$$

$$= \pi a \{ \tfrac{1}{3}(2a^2 + a^2 \cos^2 \alpha) \sin \alpha - a\alpha \cdot a \cos \alpha \}$$

$$= \pi a \left(\frac{2a^2 + c^2}{3} \sin \alpha - a\alpha \cdot c \right), \qquad c = a \cos \alpha.$$

If $c = 0$, $V = \frac{2}{3}\pi a^3$, as it should be.

431 (Calculus). Proposed by J. W. LASLEY, University of North Carolina.

Explain Bertrand's fallacy:

$$\int_{x=0}^{x=1} \int_{y=0}^{y=1} \frac{x^2 - y^2}{(x^2 + y^2)^2} dydx = \int_{y=0}^{y=1} \int_{x=0}^{x=1} \frac{x^2 - y^2}{(x^2 + y^2)^2} dxdy,$$

$$\tfrac{1}{4}\pi = -\tfrac{1}{4}\pi, \; 1 = -1.$$

SOLUTION BY HORACE OLSON, Chicago, Illinois.

There is a theorem that the order of integration of a double integral may be reversed *if the integrand is continuous in both variables within the region of integration.* The integrand in this fallacy is discontinuous at ($x = 0$, $y = 0$). Therefore, the theorem does not justify the reversal of the order of integration.

341 (Mechanics). Proposed by PAUL CAPRON, U. S. Naval Academy.

A pole l feet long, with one end on the ground, touches the top of a wall a feet high and slides in a vertical plane perpendicular to the wall. Show that its instantaneous center of rotation is at the intersection of the vertical where it touches the ground with the perpendicular to its axis where it touches the wall, and that the locus of this center is a parabola having the latus rectum a.

SOLUTION BY S. W. REAVES, University of Oklahoma.

Let T be the point at the top of the wall and G the point on the ground through which the pole passes at some given instant. Let O be the point on the ground in the same vertical line with T, and let θ be the angle TGO.

The direction of motion of any point is clearly at right angles to the line joining that point to the instantaneous center of rotation. (See Ziwet, *Theoretical Mechanics*, Art. 23; Demartres, *Cours de Géométrie infinitésimale*, Art. 20.) Hence, if the direction of motion of a point be known, the instantaneous center C must lie on the normal at the point to the direction of motion.